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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/786,790

02/25/2004

Hironori Kobayashi

CU-3608

3721

26530 7590 10/19/2010
LADAS & PARRY LLP
224 SOUTH MICHIGAN AVENUE
SUITE 1600
CHICAGO, IL 60604

EXAMINER

ANDERSON, JAMES D

ART UNIT

PAPER NUMBER

1614

MAIL DATE

DELIVERY MODE

10/19/2010

PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No. 10/786,790	Applicant(s) KOBAYASHI, HIRONORI	
	Examiner JAMES D. ANDERSON	Art Unit 1614	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 20 August 2010.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 5 and 23-27 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 5 and 23-27 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date <u>5/18/2010</u> . | 6) <input type="checkbox"/> Other: _____ |

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DETAILED ACTION

Formal Matters

Applicants' response and amendments to the claims, filed 8/20/2010, are acknowledged and entered. Claims 5 and 23-27 are pending and under examination.

Response to Arguments

Applicants' arguments, filed 8/20/2010, have been fully considered but they are not deemed to be persuasive. Rejections and/or objections not reiterated from previous office actions are hereby withdrawn. The following rejections and/or objections are either reiterated or newly applied. They constitute the complete set presently being applied to the instant application.

Information Disclosure Statement

Receipt is acknowledged of the Information Disclosure Statement filed 5/18/2010. The Examiner has considered the references cited therein to the extent that each is a proper citation. Please see the attached USPTO Form 1449.

Claim Rejections - 35 USC § 103 – New Ground of Rejection

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 5 and 23-27 are rejected under 35 U.S.C. § 103(a) as being unpatentable over **Kobayashi et al.** (EP 0 932 081 A1; Published July 28, 1999) (cited by Applicant in IDS filed 4/12/2007) in view of **Kobayashi** (USP No. 5,880,227; Issued Mar. 9, 1999) and **Yoichi et al.** (JP 2000-053421; Published February 22, 2000) (cited by Applicant in IDS filed 4/12/2007).¹

Claimed Invention

The claims are drawn to a method of producing a coating solution for forming a wettability-varied pattern, comprising preparing a neutral solution of titanium oxide, which contains titanium oxide and an alkyl silicate having the formula $\text{Si}_n\text{O}_{n-1}(\text{OR})_{2n+2}$, wherein R is an alkyl group, preparing a solution of hydrolyzed fluoroalkylsilane having the formula $\text{Y}_n\text{SiX}_{(4-n)}$, wherein Y is a fluoralkyl group, X is alkoxy, acetyl, or halogen, and n is 0 to 3 in an acidic condition, adjusting the pH of the solution of hydrolyzed fluoroalkylsilane, and mixing the neutral sol solution of titanium dioxide with the solution of hydrolyzed fluoroalkylsilane, whose pH is adjusted to 5 to 7, and wherein the pH of the coating solution is in a range of 5 to 9.

Teachings of Kobayashi et al. ('081)

Kobayashi *et al.* teach methods of varying the wettability of layers on a substrate comprising applying a photocatalyst material (page 31, ¶ [0286]). The photocatalyst material is preferably titanium oxide (page 31, ¶ [0288]).

The photocatalyst-containing layer may also contain a binder, preferably the instantly claimed polysiloxane containing a fluoroalkyl group, specifically hydrolysis condensates of fluoroalkylsilanes (page 32, ¶ [0295]). It is noted that the polysiloxanes containing fluoralkyl groups listed on pages 32-33 of Kobayashi meet the limitations of the claimed hydrolyzed fluoralkylsilanes (*e.g.*, $\text{CF}_3(\text{CF}_2)_3\text{CH}_2\text{CH}_2\text{Si}(\text{OCH}_3)_3$). In fact, Kobayshi explicitly teaches organopolysiloxanes composed mainly of a hydrolysis condensate of compounds represented by formula $\text{Y}_n\text{SiX}_{(4-n)}$, wherein Y is an alkyl, fluoralkyl, vinyl, amino, or epoxy group, X is methoxy, ethoxy, acetyl, or halogen, and n is 1 to 3 ([0293]).

Kobayashi teaches that the use of polysiloxanes containing fluoroalkyl groups as binders results in markedly improved water repellency and oil repellency of the photocatalyst-containing layer (page 33, ¶ [0296]).

With respect to mixing a solution of titanium oxide and fluoroalkylsilicate as recited in claim 5, Kobayashi teaches that the photocatalyst (*e.g.*, titanium oxide) and

¹ A machine translation of Yoichi was provided in the Office Action mailed 3/25/2008

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binder (e.g., fluoroalkylsilicate) are “dispersed in a solvent to prepare a coating liquid” ([0332]).

The Kobayashi *et al.* reference does not teach preparing the solution of hydrolyzed fluoroalkylsilane in an acidic condition or a solution of titanium dioxide containing an alkyl silicate or that the solution is at a neutral pH.

Teachings of Kobayashi *et al.* ('227)

Kobayashi '227 teaches a water-repellent silicone composition (Abstract and Column 1 Lines 7-10) comprising a fluorosilicone resin formed from a (co)hydrolysis condensate of fluoroalkylsilane wherein the hydrolyzed fluoroalkylsilane is prepared strongly acidic because the hydrolysis is conducted by reacting the fluoroalkylsilane with a strong acid in an acidic solution (Column 3 Lines 12-41). Thus Kobayashi '227 teaches that hydrolyzed polysiloxanes, specifically fluoroalkylsilanes, solutions are prepared strongly acid so that hydrolysis can take place.

Teachings of Yoshi *et al.*

Yoichi *et al.* teach methods of preparing a titanium oxide solution having superior dispersibility in a neutral pH range for use as a photocatalyst, a catalyst, catalyst support, adsorbent, an ultraviolet ray absorbent, paint, or bulking agent (Abstract). A titanium oxide solution is mixed with an alkyl silicate as a dispersion stabilizer and the resultant mixture is neutralized to prepare the objective titanium oxide solution (*id.*).

With respect to the claimed alkyl silicates, Yoichi teaches alkyl silicates having the same structure as those claimed ([0009] of provided machine translation).

With respect to the pH of 5 to 9 as recited in claim 5 and the claimed weight ratio of 0.7 to 10 as recited in claim 24, Yoichi teach the same pH range and weight ratio as claimed (Abstract; [0006] of provided machine translation).

With respect to diluting with a hydrophilic solvent as recited in claims 26 and 27, Yoichi teaches that the titanium oxide sol and/or the alkyl silicate of the invention can be

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blended with a hydrophilic solvent and still maintain excellent dispersion stability ([0010] and [0014] of provided machine translation).

The titanium oxide/alkyl silicate solutions taught in Yoichi are further taught to be useful as photocatalysts as also taught by Kobayashi *et al.* ([0019] of provided machine translation).

Yoichi does not teach adding a fluoroalkyl silane to the titanium oxide/alkyl silicate solutions taught therein.

Principles of Law

The question of obviousness is resolved on the basis of underlying factual determinations including: (1) the scope and content of the prior art; (2) the level of ordinary skill in the art; (3) the differences between the claimed invention and the prior art; and (4) secondary considerations of nonobviousness, if any. *Graham v. John Deere Co.*, 383 U.S. 1, 17 (1966). The Supreme Court has emphasized that "the [obviousness] analysis need not seek out precise teachings directed to the specific subject matter of the challenged claim, for a court can take account of the inferences and creative steps that a person of ordinary skill in the art would employ." *KSR Int'l Co. v. Teleflex Inc.*, 550 U.S. 398, 418 (2007).

Analysis & Examiner's Determination of Obviousness

It would have been *prima facie* obvious to one of ordinary skill in the art at the time the invention was made to apply the technique of mixing titanium oxide and an alkyl silicate at a neutral pH as taught in Yoichi *et al.*, to improve the dispersibility of the titanium oxide in the fluoralkylsilane-containing solutions of Kobayashi *et al.* The resulting coating solution would predictably have increased dispersibility at a neutral pH, which would clearly aid in applying said containing coating solutions to a substrate so as to induce varied wettability as taught in Kobayashi *et al.*

With respect to the pH of the solution of hydrolyzed fluoroalkylsilane solution, Kobayashi *et al.* ('227) teach that in the preparation of hydrolyzed fluoroalkylsilane

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solutions, hydrolyzed fluoroalkylsilane is prepared strongly acidic because the hydrolysis is conducted by reacting the fluoroalkylsilane with a strong acid in an acidic solution.

Furthermore, Yoichi teach solutions of titanium oxide and alkyl silicates having a **final pH of 5 to 9**. As such, it would be obvious to prepare an acidic solution of fluoroalkylsilanes in order to prepare hydrolyzed fluoroalkylsilanes and to adjust the pH after hydrolysis has occurred so that when mixed with the titanium dioxide solutions taught in Yoshi the final solution has a pH of 5 to 9.

With respect to the ratio of neutral sol solution of titanium oxide to the solution of hydrolyzed fluoralkylsilane as recited in claim 23, no unobviousness is seen in varying the ratio of these solutions. While Kobayashi does not explicitly teach a ratio of titanium oxide to fluoralkylsilane, the reference does teach that the photocatalyst (*e.g.*, titanium oxide) in the photocatalyst-containing layer is preferably 5 to 60% by weight, more preferably 20 to 40% by weight ([0291]). Accordingly, it would have been obvious to add a binder such as a fluoralkylsilane as taught in Kobayashi in a range of 95 to 40% by weight, more preferably 80 to 60% by weight (*i.e.*, the remaining weight percentage), which amount falls within the ratio of 1:0.1 to 1 as recited in claim 23 (titanium oxide:fluoralkylsilane). It is noted that Example C-1 of Kobayashi provides a solution comprising 2 g of an inorganic coating composition for a photocatalyst and 0.3 g of a fluoroalkylsilane, *i.e.*, a ratio of 1:0.15 ([0562]), and Example D-1 of Kobayashi provides a solution comprising 2 g titanium oxide and 0.15 g of a fluoroalkylsilane, *i.e.*, a ratio of 1:0.075 ([0595]).

Response to Arguments

Applicant traverses the instant rejection, stating that it is necessary to hydrolyze a siloxane compound in acidic condition in order to obtain fluoroalkylsilane. The Examiner agrees with this statement, as this is precisely what is taught by Kobayashi et al. ('227). Applicant argues that the method of producing a coating solution recited in the amended claim 5 attains the effect of producing a coating solution without destroying a state where titanium dioxide is finely dispersed by adjusting the fluoroalkylsilane produced in an acidic condition to neutral first and then mixing with the separately

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prepared neutral sol solution of titanium dioxide. Applicant argues that none of the prior art teaches or suggests the adjustment of the fluoroalkylsilane prepared in the acidic condition to neutral.

Applicant's arguments have been carefully considered but they are not persuasive. The cited prior art teaches, suggests, and motivates solutions of a fluoroalkylsilane and titanium dioxide. The prior art teaches solutions of hydrolyzed fluoroalkylsilanes and a photocatalyst (e.g., titanium dioxide). The prior art teaches methods of preparing a titanium oxide solution having superior dispersibility in a neutral pH range for use as a photocatalyst. The prior art teaches that in the preparation of solutions of hydrolyzed fluoroalkylsilanes, solutions are prepared strongly acid so that hydrolysis can take place.

As such, no unobviousness is seen in Applicant's claimed method of preparing an acidic solution of fluoroalkylsilanes, neutralizing said solution, and mixing the neutral solution of hydrolyzed fluoroalkylsilanes with a neutral solution of titanium dioxide such that the final pH of the mixed solution is in the range of 5 to 9. The skilled artisan would recognize that if an acidic solution is mixed with a neutral solution, the final pH of the mixed solution would be acidic. As such, the skilled artisan would find it obvious to first adjust the pH of the acidic solution to neutral *prior to* mixing with another neutral solution in order to make a solution having a final pH in the range of 5 to 9.

Accordingly, the claims are deemed properly rejected for the reasons of record and as reiterated above.

Conclusion

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the

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shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to JAMES D. ANDERSON whose telephone number is (571)272-9038. The examiner can normally be reached on MON-FRI 9:00 am - 5:00 pm EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Ardin Marschel can be reached on 571-272-0718. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/James D. Anderson/
James D. Anderson, Ph.D.
Primary Patent Examiner, Art Unit 1614
UNITED STATES PATENT AND TRADEMARK OFFICE
400 Dulany Street
Alexandria, VA 22314-5774
Tel. No.: (571) 272-9038